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FCC TEST REPORT

Under:
FCC Part 15, Class B

Prepared For:

AR Devices LLC

498 Northgate Dr., San Jose, CA 95111, USA

FCC ID: 2AHFWGOGGLEPAL

EUT: Wearable Device

Model: Gogglepal Sport

February 4, 2016

Issue Date:

Original Report

Report Type:

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Test Engineer: Eric Guo

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Review By: Apollo Liu / Manager

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1. General Information

1. 1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1. 2 Testing Laboratory

Ke Mei Ou Laboratory Co., Ltd.

ANSI-ASQ National Accreditation Board/ACCLASS ISO/IEC 17025 Accredited Lab for telecommunication standards. The Registration Number is AT-1532. The testing quality system meets with ISO/IEC-17025 requirements, This approval results is accepted by MRA of ILAC.

FCC Test Site Registration Number: 962205

IC Test Site Registration Number: 4986A-2

Internet: www.kmolab.com

1. 3 Details of Applicant

Name : AR Devices LLC

Address : 498 Northgate Dr., San Jose, CA 95111,USA

1. 4 Application Details

Date of Receipt of Application : November 30, 2015

Date of Receipt of Test Item : November 30, 2015

Date of Test : February 1~February 4, 2016

1. 5 Test Item

Manufacturer : Same as applicant

Address : Same as applicant

Trade Name : Gogglepal

Model No.(Base) : Gogglepal Sport

Model No.(Extension) : Gogglepal Connect

Description : Wearable Device

Additional Information

Product Type : Bluetooth 4.0 LE (1TX, 1RX)

Radio Type : Intentional Transceiver

Power Type : DC 5V

Modulation : see the below tables

Data Modulation : Bluetooth: GFSK (1Mbps))

Date Rate (Mbps) : see the below table

Frequency Range : 2402~2480MHz

Channel Number : 40

Antenna : Internal 1.7dBi

Bluetooth

Type of Modulation	Data Rate
GFSK	1Mbps

1. 6 Test Standards

FCC Part 15, Class B

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2. Technical Test

2. 1 Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107	Conducted Test	PASS	Complies
FCC Part 15, Paragraph 15.109	Radiated Test	PASS	Complies

3. EUT Modifications

No modification by test lab.

4. Conducted Power Line Test

4.1 Test Equipment

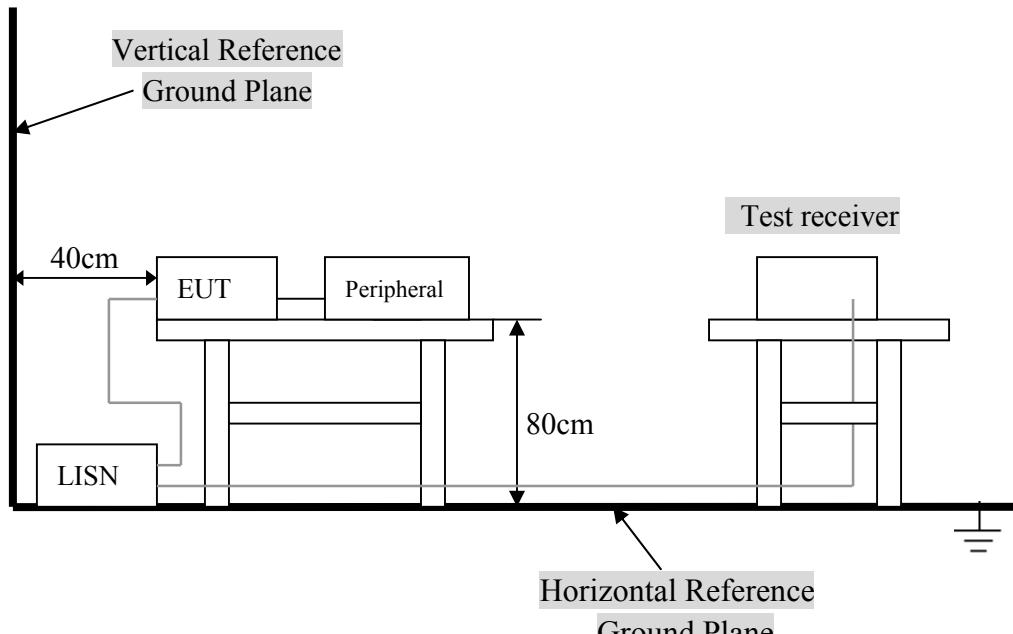
Please refer to Section 8 this report.

4.2 Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission., the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

4.3 Test Setup



For the actual test configuration, Please refer to the related items – Photos of Testing.

4.4 Configuration of The EUT

The EUT was configured according to ANSI C63.4:2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model #	FCC ID
Wearable Device	Same as applicant	Gogglepal Sport	2AHFWGOGGLEPAL

B. Internal Devices

Device	Manufacturer	Model #	FCCID / DoC
N/A			

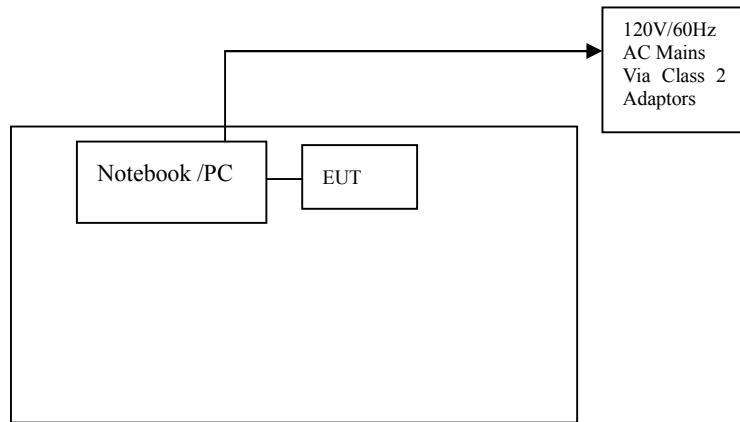
C. Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
Printer	HP	HP930C	DoC	1.5m unshielded power cord 1.2m unshielded data cable.
Modem	GVC	N/A	DoC	1.5m unshielded power cord 1.2m unshielded data cable.
Notebook	DELL	PP10L	DoC	1.5m unshielded power cord
PC	Dell	2400n	DoC	1.5m unshielded power cord

4.5 EUT Operating Condition

Operating condition is according to ANSI C63.4:2014.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- A. Modulate output capacity of EUT up to specification.



4.6 Conducted Power Line Emission Limits

Frequency Range (MHz)	Class A QP/AV (dBuV)	Class B QP/AV (dBuV)
0.15 – 0.5	79/66	66 – 56/56 – 46
0.5 – 5.0	73/60	56/46
5.0 – 30	73/60	60/50

Note: In the above table, the tighter limit applies at the band edges.

4.7 Conducted Power Line Test Result

Product	: Wearable Device	Test Mode	: Normal Link / Auto
Test Item	: Conducted Emission Data	Temperature	: 25 °C
Test Voltage	: DC 5V	Humidity	: 56%RH
Test Result	: PASS	Adapter Model	:

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All readings are quasi -peak values with a resolution bandwidth of 9 KHz.

- Temperature : 26 °C
- Humidity : 53 % RH

FCC Part 15 Paragraph 15.107							
Frequency (MHz)	Emission (dBuV)		LINE/NEUTRAL	Limit (dBuV)		Margin (dB)	
	QP	AV		QP	AV	QP	AV
0.154	48.08	31.14	Line	65.78	55.78	-17.70	-24.64
0.178	55.58	42.81	Neutral	64.58	54.58	-9.00	-11.77
0.170	53.26	39.15	Line	64.96	54.96	-11.70	-15.81
0.186	54.54	39.63	Neutral	64.21	54.21	-9.67	-14.58
0.182	55.27	41.02	Line	64.39	54.39	-9.12	-13.37
0.198	53.22	39.45	Neutral	63.69	53.69	-10.47	-14.24
0.230	47.08	34.45	Line	62.45	52.45	-15.37	-18.00
0.206	48.89	34.25	Neutral	63.37	53.37	-14.48	-19.12
3.654	40.36	31.25	Line	56.00	46.00	-15.64	-14.75
3.430	39.44	31.12	Neutral	56.00	46.00	-16.56	-14.88
3.810	40.59	30.67	Line	56.00	46.00	-15.41	-15.33
3.766	39.28	30.14	Neutral	56.00	46.00	-16.72	-15.86

Note: NF = No Significant Peak was Found.

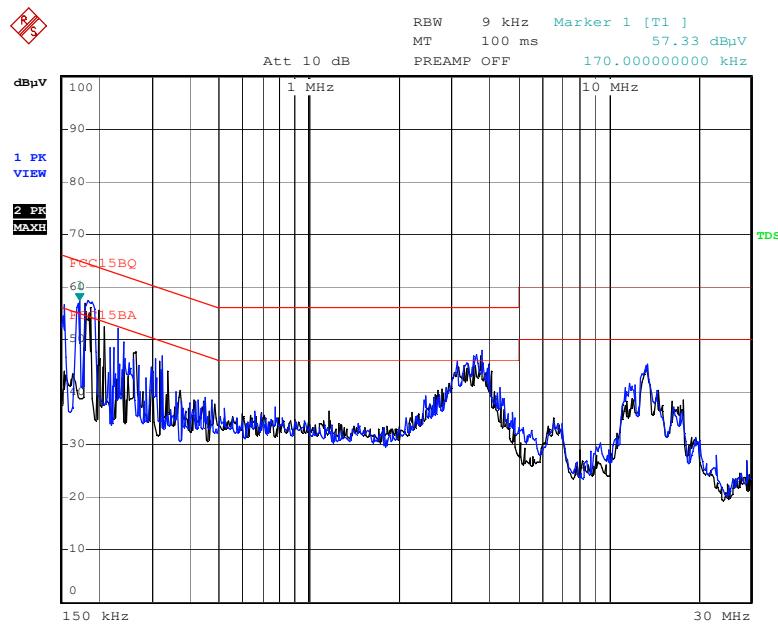
Note:

- Uncertainty in conducted emission measured is <+/ -2dB.
- The emission levels of other frequencies were very low against the limit.
- All Reading Levels are Quasi-Peak and Average value.
- Emission = Meter Reading + Factor; Factor = Insertion Loss + Cable Loss.
- Margin Value = Emission Level - Limit Value.

Conducted Emission**FCC 15.107**

Test Specification: LINE&NEUTRAL

Comment:



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5. Radiated Emission Test

5. 1 Test Equipment

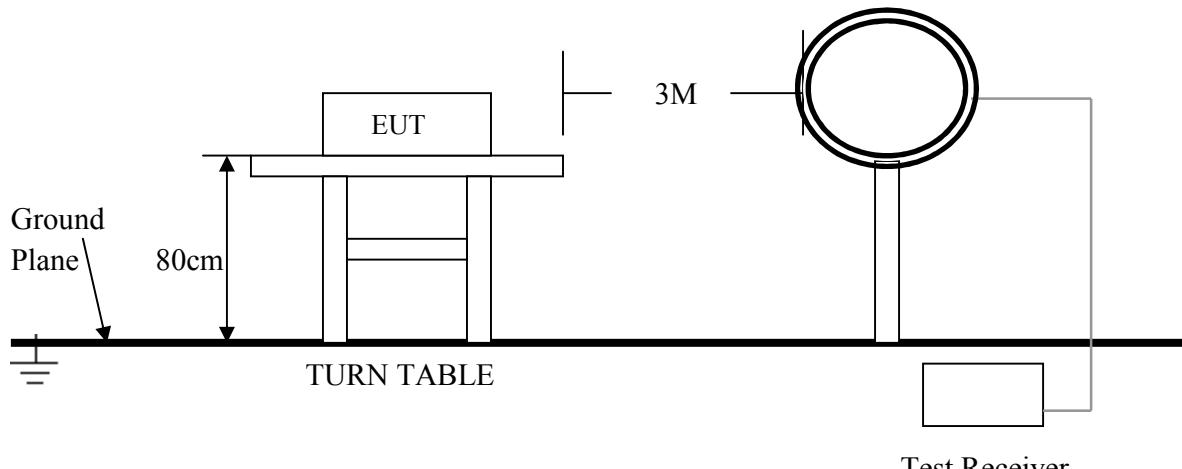
Please refer to Section 8 this report.

5. 2 Test Procedure

1. The EUT was tested according to ANSI C63.4:2014.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m, and which is 1.5 m high for above 1 GHz. All set up is according to ANSI C63.4:2014 .
3. The frequency spectrum from 9 kHz to 25 GHz was investigated. All readings from 9 kHz to 150 kHz are quasi-peak values with a resolution bandwidth of 200 Hz. All readings from 150 kHz to 30 MHz are quasi-peak values with a resolution bandwidth of 9 KHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. The Receiving antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency. Emissions below 30MHz were measured with a loop antenna while emission above 30MHz were measured using a broadband E-field antenna.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4:2014

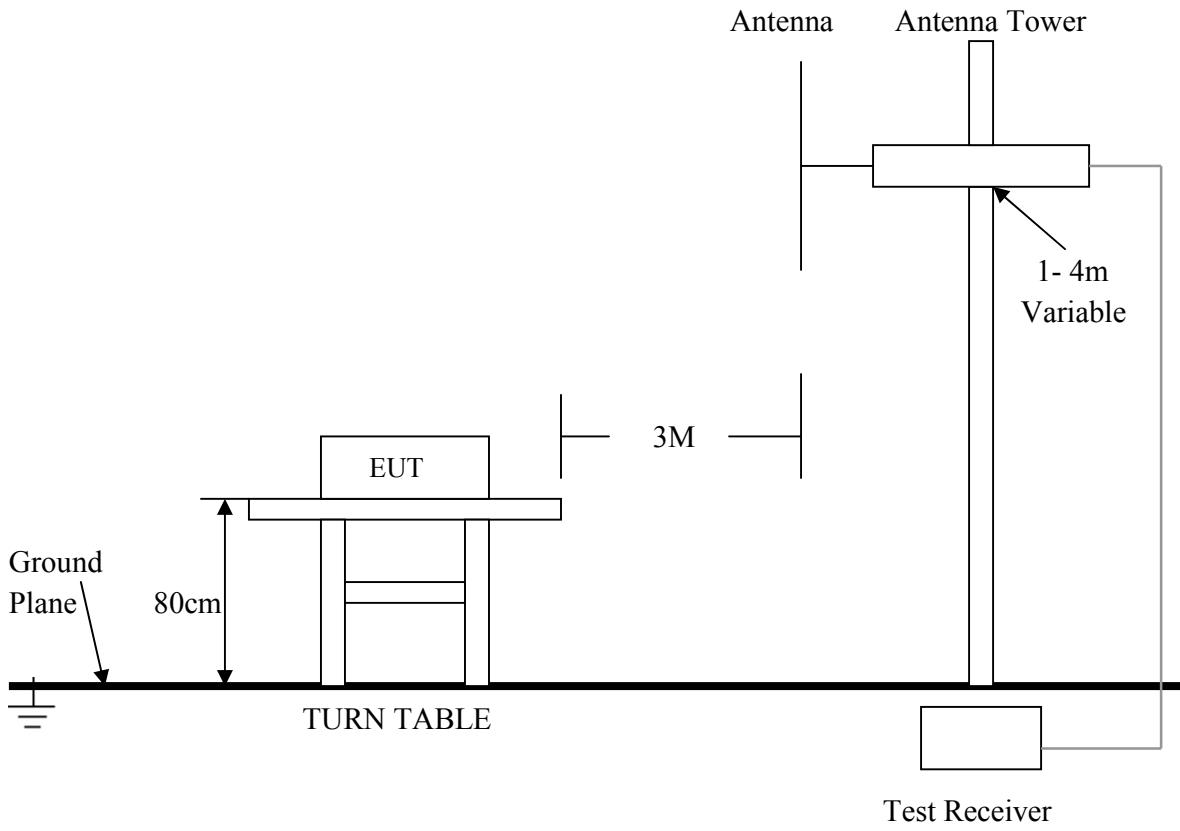
5. 3 Radiated Test Setup

For Frequencies below 30 MHz



For the actual test configuration , please refer to the related items – Photos of Testing

For Frequencies above 30 MHz



For the actual test configuration , please refer to the related items – Photos of Testing

5.4 Configuration of The EUT

Same as section 4.4 of this report

5.5 EUT Operating Condition

Same as section 4.5 of this report

5.6 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.109.

Frequency (MHz)	Distance (m)	Field Strength (dBuV/m)
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
Above 960	3	54.0

Note:

1. In the emission tables above, the tighter limit applies at the band edges.
2. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.
3. The lower limit shall apply at the transition frequencies.

5. 7 Radiated Emission Test Result

Product	: Wearable Device	Test Mode	: Normal Link / Auto
Test Item	: Fundamental Radiated Emission Data	Temperature	: 25 °C
Test Voltage	: DC 5V	Humidity	: 56%RH
Test Result	: PASS	Model	:

For Frequency below 30MHz

Freq. (MHz)	Emission (dBuV/m) QP Detector	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
N/A				

Note:

- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

For Frequency from 30MHz to 1GHz

Freq. (MHz)	Emission (dBuV/m) QP Detector	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
383.960	27.22	HORZ	46.0	-18.78
33.040	25.25	VERT	40.0	-14.75
525.400	29.13	HORZ	46.0	-16.87
94.520	22.67	VERT	43.5	-20.83
622.880	30.99	HORZ	46.0	-15.01
157.120	24.13	VERT	43.5	-19.37

Note:

- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

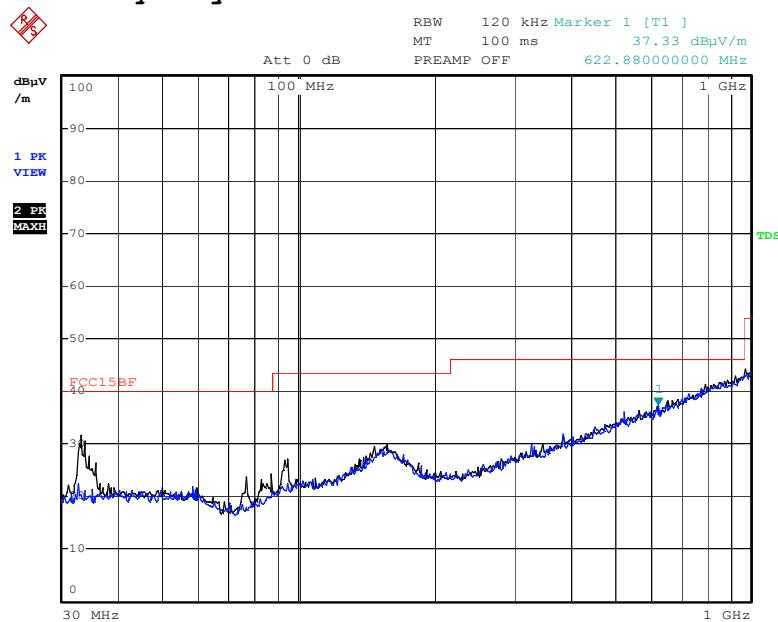
Frequency above 1 GHz

Freq. (MHz)	Emission (dBuV/m)		HORIZ / VERT	Limits (dBuV/m)		Margin(dB)	
	PK	AV				PK	AV
1372.400	41.25	28.49	HORZ	74	54	-32.75	-25.51
1274.400	41.67	28.43	VERT	74	54	-32.33	-25.57
2298.000	46.45	33.24	HORZ	74	54	-27.55	-20.76
2436.400	49.58	33.42	VERT	74	54	-24.42	-20.58
2436.000	49.21	33.45	HORZ	74	54	-24.79	-20.55
2845.600	48.78	35.58	VERT	74	54	-25.22	-18.42

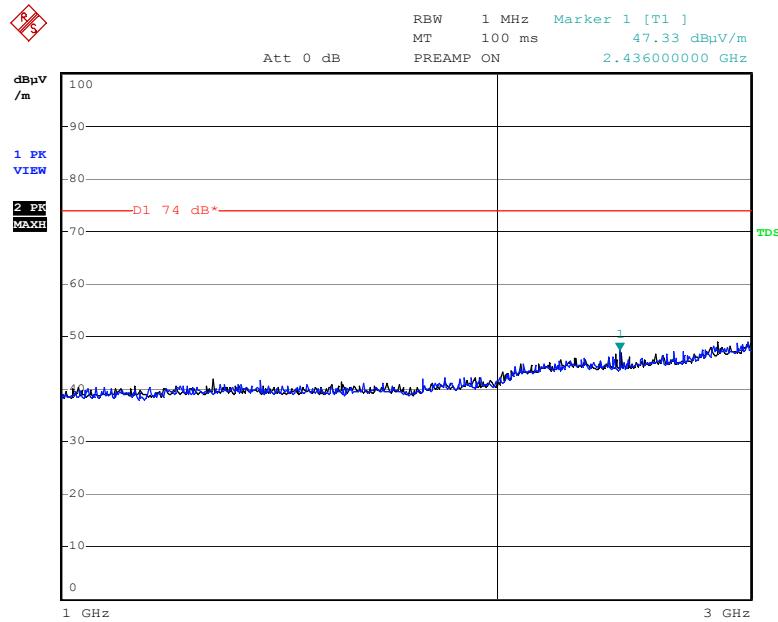
Note:

- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

Radiated Emission
FCC 15.109
For Frequency from 30MHz to 1GHz



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For Frequency above 1GHz



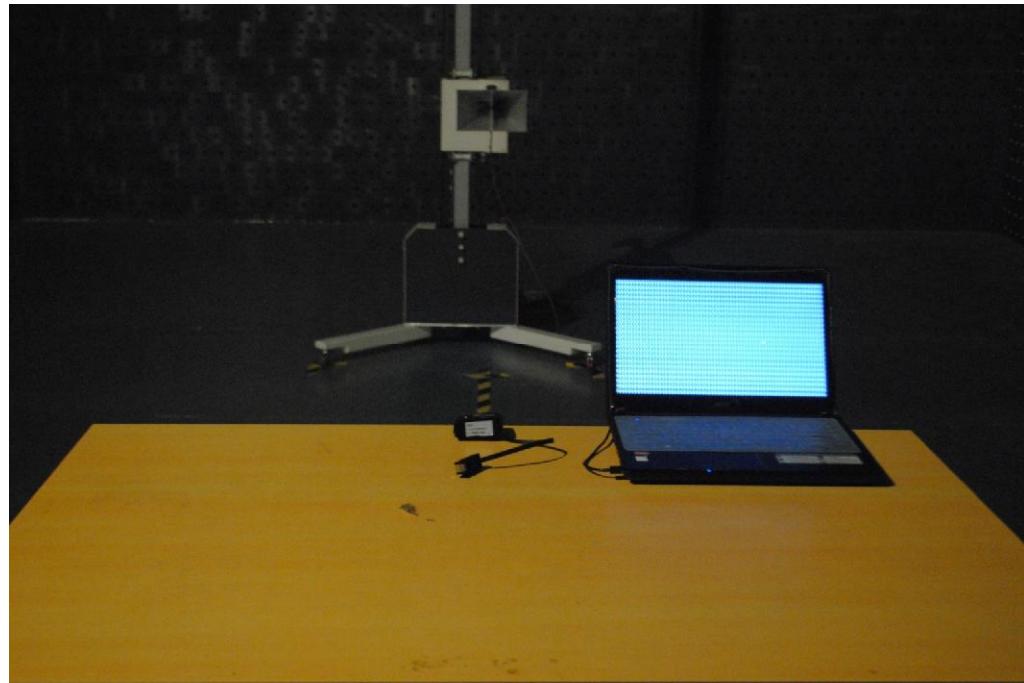
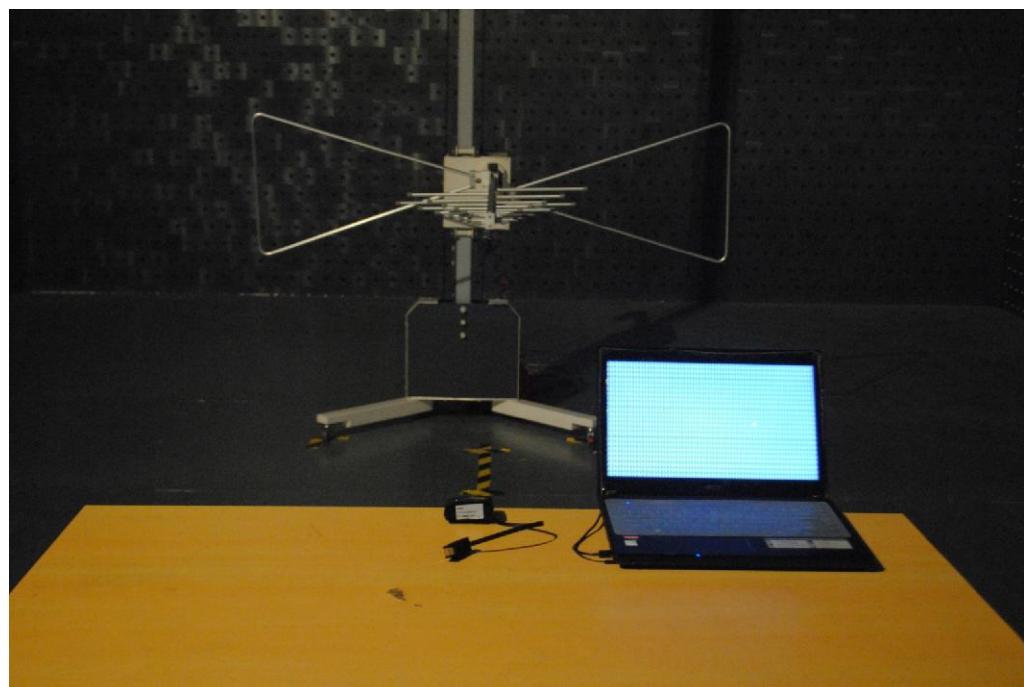
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6. Photo of Testing

6.1 Emission test view

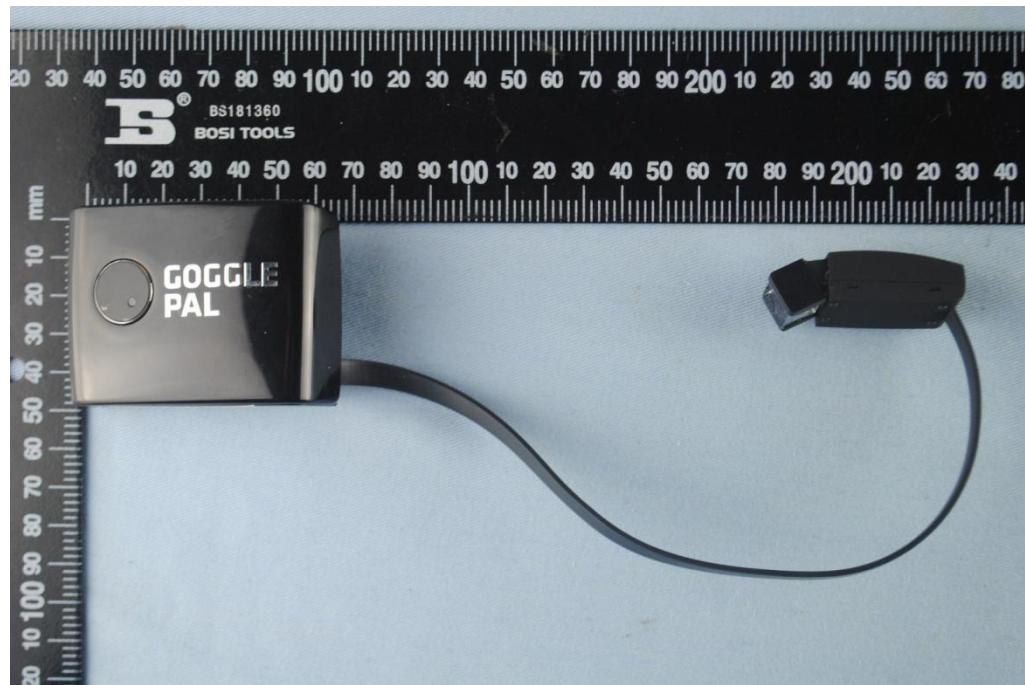
Conducted Emission test view



Radiated Emission test view

6.2 Photograph - EUT

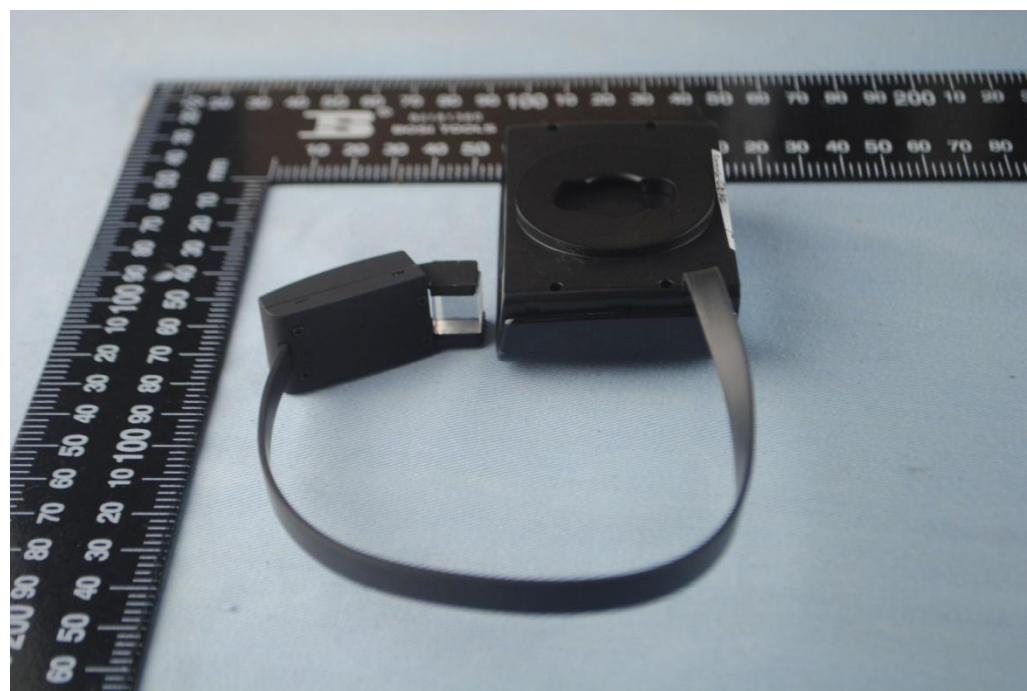
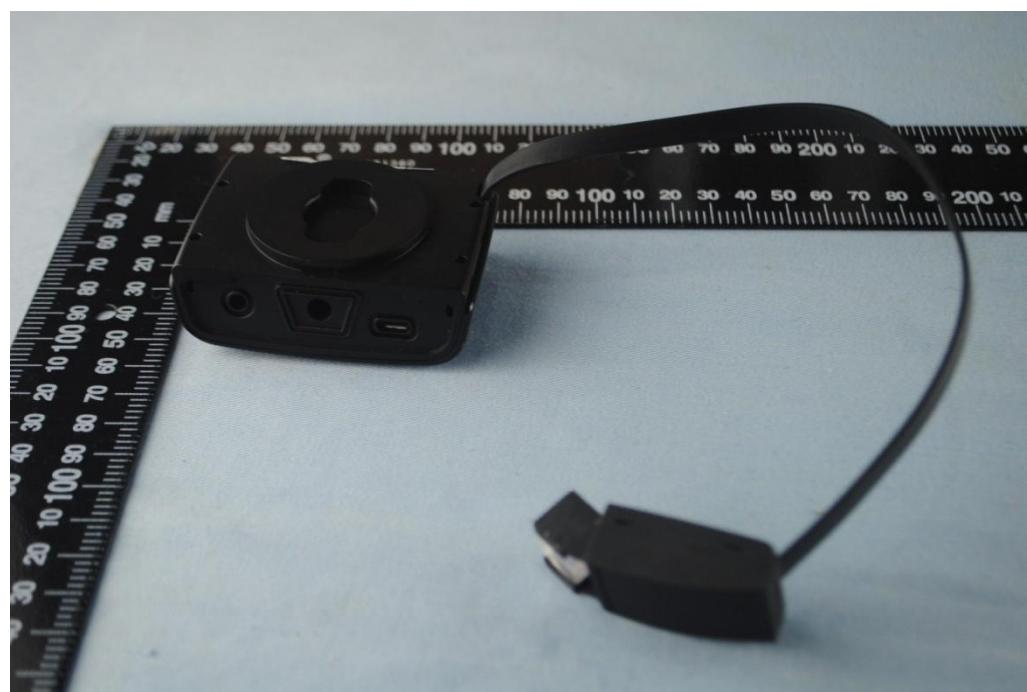
EUT top view



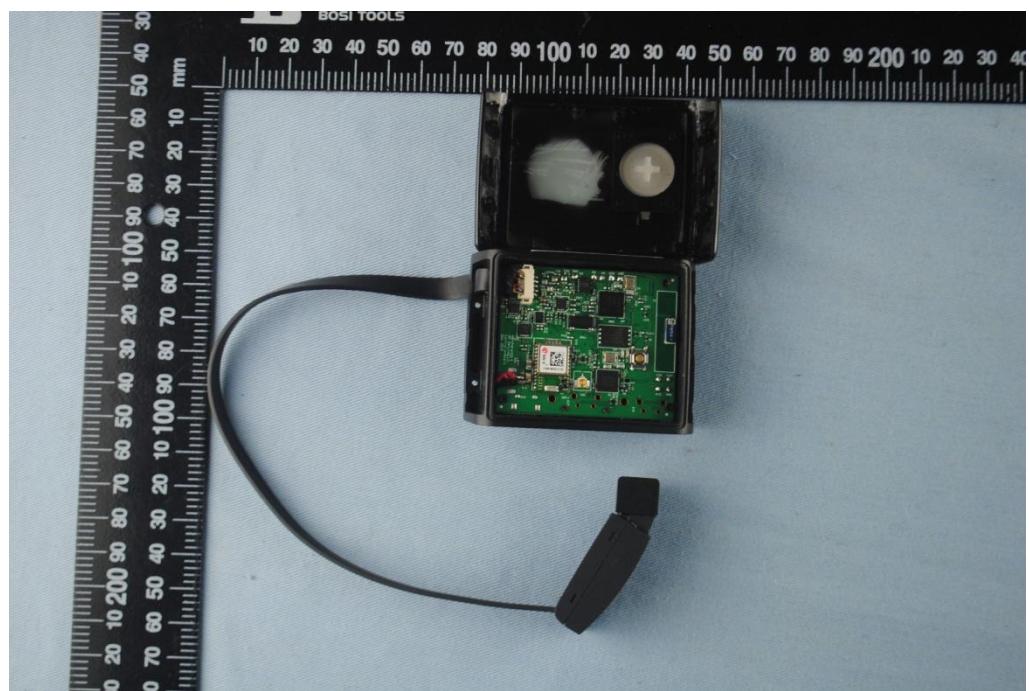


EUT bottom view

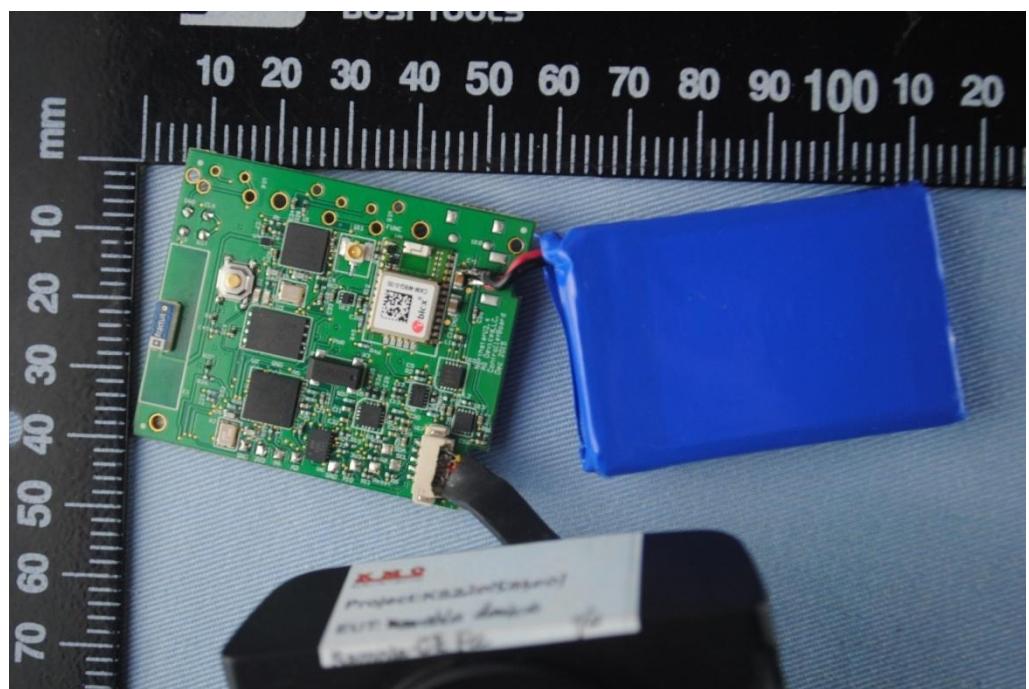


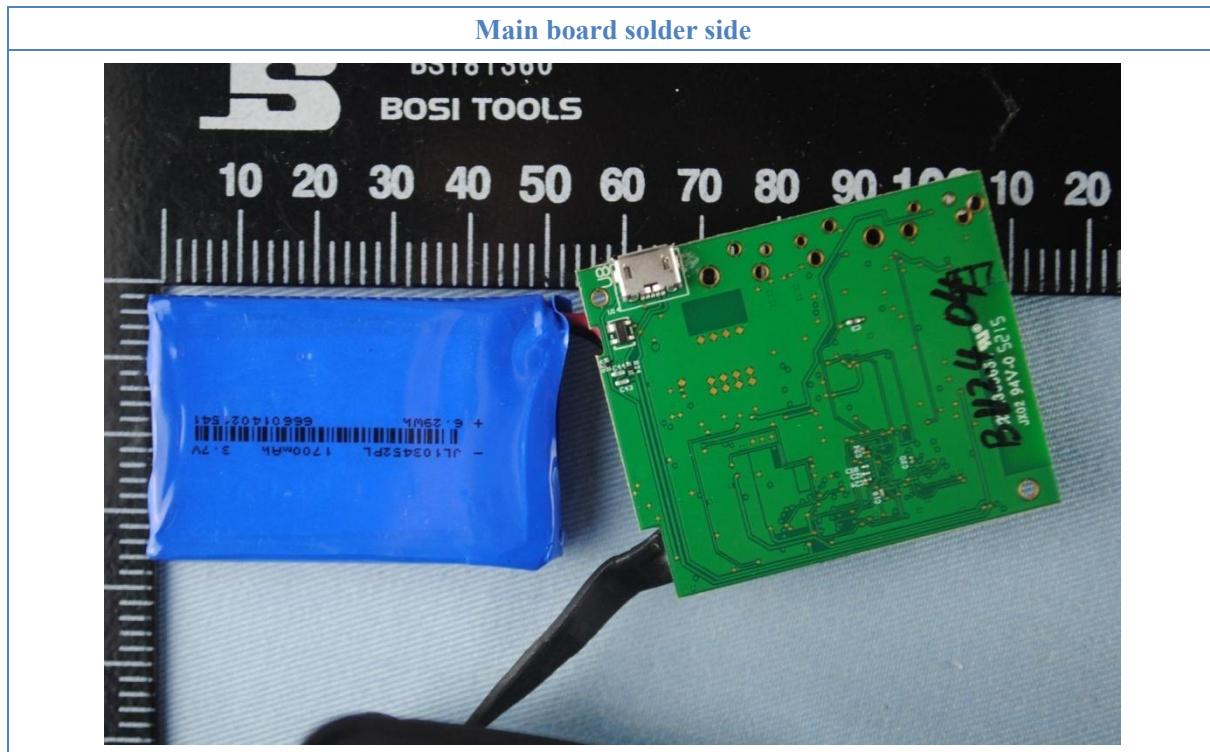


EUT inside whole view



Main board component side





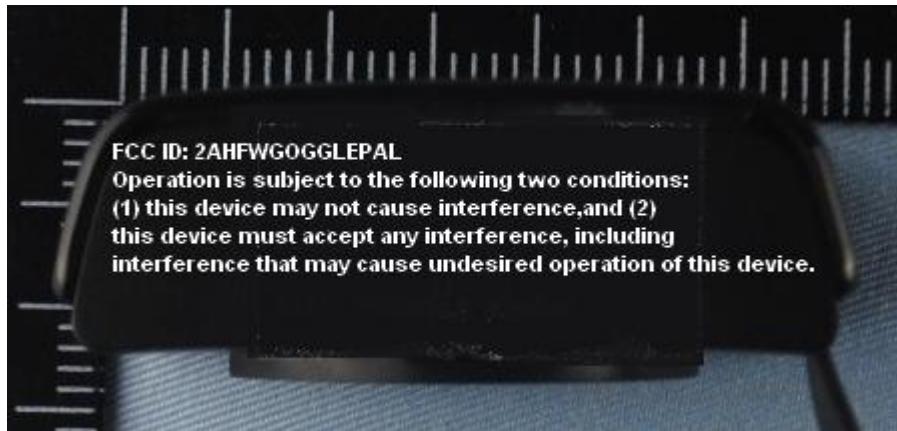
7. FCC ID Label

FCC ID: 2AHFWGOGGLEPAL

The following note shall be conspicuously placed in the users manual: **“Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.”**

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT



8. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Due Date
Turntable	Innco systems GmbH	CT-0801	KMO-SZ114	NCR
Antenna Tower	Innco systems GmbH	MM4000-PP	KMO-SZ115	NCR
Controller	Innco systems GmbH	CO2000	KMO-SZ116	NCR
Pre-Amplifier	Agilent	87405C	KMO-SZ155	Dec.6, 2016
Pre-Amplifier	Com-Power	PAM-840	KMO-SZ156	Dec.6, 2016
Horn Antenna	Com-Power	AH-840	KMO-SZ157	Dec.6, 2016
EMI Test Receiver	Rohde & Schwarz	ESPI7	KMO-SZ002	June 27, 2016
Spectrum Analyzer	Rohde & Schwarz	FSP40	KMO-SZ003	June 27, 2016
Signal Generator	FLUKE	PM5418+Y/C	KMO-SZ020	May 27, 2016
Loop Antenna	Rohde & Schwarz	HFH2-Z2	KMO-SZ004	August 19, 2018
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	KMO-SZ005	August 27, 2018
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	KMO-SZ006	August 19, 2018
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	KMO-SZ007	August 19, 2018
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	KMO-SZ008	August 19, 2018
AMN	Rohde & Schwarz	ESH3-Z5	KMO-SZ009	June 27, 2016
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	KMO-SZ077	Nov.29, 2016
ISN	SCHWARZBECK	NTFM 8158 CAT3	KMO-SZ070	Nov.19, 2016
ISN	SCHWARZBECK	NTFM 8158 CAT5	KMO-SZ071	Nov.19, 2016
ISN	SCHWARZBECK	NTFM 8158 CAT6	KMO-SZ072	Nov.19, 2016
KMO Shielded Room	KMO	KMO-001	KMO-SZ036	NCR
Coaxial Cable with N-Connectors	SCHWARZBECK	AK9515H	KMO-SZ037	Sep.18, 2016
AC Power Source / Analyzer	Agilent	6813B	KMO-SZ166	July 22, 2016
Power Meter	Rohde & Schwarz	OSP-B157	KMO-HK015	Nov.6, 2016
Digital Radio Communication Tester	Rohde & Schwarz	CMD60	KMO-SZ169	April 10, 2016
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	KMO-SZ170	April 10, 2016
Regulatory Test System 30 MHz to 40 GHz	Rohde & Schwarz	TS8997	KMO-HK015	Nov.6, 2016
Program Control Telephone Exchanger	Exceltel	CDX8000-M	KMO-SZ221	NCR
3m Anechoic Chamber	KMO	KMO-3AC	KMO-3AC-1	Nov.12, 2016
Temperature Chamber	TABAI	PSL-4GTW	N/A	Feb.10, 2016